Effects of chemical treatments of barley straw on leaching, and digestibility by rumen fluid and cellulolytic bacteria

ABSTRACT

Effects of chemical treatments on in sacco and in vitro digestibility of barley straw by rumen fluid and pure cultures of celluloytic bacteria were studied to evaluate the pretreatment and to improve the poor quality feed. Chemicals were applied by dissolving them in water equivalent to 40% of the weight of the straw (dry matter basis). Pretreatment with 5% NaOH yielded the largest increase in sacco digestion followed by pretreatment with 2% (NH4)2SO3, 2.6% NH4OH, 1.6% NaHSO3 and untreated straw (control). In sacco dry matter digestibility of straw treated with NaOH and (NH4)2SO3 continued to increase as the concentration of chemical increased (1 to 7.5%), as it was the in vitro dry matter loss by leaching. Treatment of barley straw with 5% NaOH enhanced significantly ($p<0.01$) in vitro digestibility by rumen fluid, Fibrobacter succinogenes and Ruminococcus albus though the fermentation products by celluloytic bacteria were low, whereas the treatment with 5% (NH4)2SO3 inhibited in vitro digestibility by F. succinogenes and R. albus together with lower fermentation products. Dry matter loss by leaching and bacterial digestion from barley straw treated with NaOH and (NH4)2SO3 suggested the effect of pretreatment with these chemicals were based on leaching, and the celluloytic bacteria had little to do with digestion.

Keyword: Barley straw; Nylon bag; Ruminococcus albus; Fibrobacter succinogenes; Chemical treatments; Cellulose digestion